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Patterns and Factors Associated With Respiratory Care Protocol Use

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BACKGROUND: Organizational factors associated with adoption and use of respiratory care protocols have received little attention. This study examines patterns of protocol use and features of a hospital and providers that are associated with respiratory care protocol use. METHODS: Forty-four hospitals and their health-care providers responded to an online survey regarding perceived outcomes of protocol use and their level of support for using protocols. Hospital features (ie, size, teaching status, and use of information systems) were also assessed. Descriptive statistics and multivariate logistic regression were used for analysis. RESULTS: Of the 9 types of respiratory care protocols assessed (ie, asthma, COPD, ARDS, hypoxemia, pneumonia, noninvasive ventilation therapy, supplemental oxygen titration and discontinuation, ventilator weaning, and bronchopulmonary hygiene), the most commonly used were for oxygen titration and ventilator weaning. Large hospitals (> 350 beds) used protocols more widely than smaller hospitals ($P = .01$). Respondents felt that use of protocols enhanced cost and quality of care. Finally, hospital features that were associated with overall protocol use were stakeholder support for protocol use and use of high-quality hospital information systems. CONCLUSIONS: The study extends prior research by clarifying features of hospitals and providers associated with use of respiratory care protocols. Validation in future hypothesis-testing samples will further advance this knowledge. *Key words: empowerment; respiratory care; protocols; quality; information systems; empirical research; organizational study.* [Respir Care 0;0(0):1–•. © 0 Daedalus Enterprises]

Introduction

It has been suggested that future demand for respiratory care services will increase, respiratory care costs will increase, and there will be a shortage of skilled respiratory caregivers.[1] In fact, the Bureau of Labor Statistics suggests that demand for respiratory therapists (RTs) will grow by 19% from 2012 to 2022, which far exceeds average job growth rates.[2] In a time when the demand and costs for respiratory care services are increasing, there is a clear need for formal and efficient systems that can optimize care while also lowering costs and balancing supply and demand. One such system of care may be the use of RT-driven protocols, also called respiratory care protocols. The use of respiratory care protocols has been shown to enhance the quality of respiratory care and reduce the misallocation of respiratory care resources.[3-10] Despite these demonstrated benefits, adoption of such protocols has been variable. Although many RTs and managers understand and possibly use individual protocols, few hospitals have implemented a comprehensive respiratory care protocol service, such as a fully developed and implemented assess and treat system.[10]

The wide disparity in the use of respiratory care protocols across hospitals prompts the question of what environmental factors are associated with their adoption and use, which to date has received little attention.[11] To our knowledge, the only study to examine this issue showed

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that respiratory therapy departments that were deemed change-avid were more likely to use respiratory care protocols than were change-averse departments.[11]

To more fully understand the factors associated with the use of respiratory care protocols, we examined their use within hospital units across a spectrum of hospital and unit types. Furthermore, we compared systemic features of hospitals using such programs versus others in which respiratory care is delivered using a more traditional physician-directed approach. Three features that we specifically examined within hospitals included: the use of quality management practices, the use of a standardized and integrated information system, and the level of organizational and clinician support for respiratory care protocol use. Other questions that we examined include: (1) What are the differences between hospital units that are high versus low users of protocols? (2) To what degree does key stakeholder support for protocol use (eg, by physicians, RT managers, and RTs on the hospital unit) differ between hospital units using respiratory care protocols versus those not using such protocols? (3) What are the opinions of these stakeholder groups regarding the advantages and disadvantages of respiratory care protocols versus physician-directed care? This study furthers available research by considering multiple hospital and health-care provider characteristics as correlates of respiratory care protocol use.

QUICK LOOK

Current knowledge

Labor statistics suggest that the future demand for respiratory care services will increase, respiratory care costs will increase, and there will be a shortage of skilled respiratory therapists (RTs). An increased demand for respiratory care services requires formal and efficient systems that can optimize care while lowering costs and balancing supply and demand. One such system of care may be the use of RT-driven protocols.

What this paper contributes to our knowledge

Larger hospitals reported using respiratory therapy protocols more often than small hospitals, but there was no difference between teaching and non-teaching hospitals. There was agreement that the use of protocols lowered costs, improved patient satisfaction, and quality. Different stakeholders disagreed on the impact of protocols on RT workload. The features most strongly associated with protocol use were physician support and a high-quality hospital information system.

Methods

The study was approved as exempt from written consent by the institutional review board of the University of South Carolina; all participants granted verbal informed consent to participate. Eligible hospitals for the study were United States acute care, non-government hospitals. Within such hospitals, the level of analysis was the individual hospital unit, of which 4 types were analyzed: the ICU, emergency department, adult in-patient unit, and neonatal ICU.

Several organizational features were used to assess an association with respiratory care protocol use: level of organizational support for using respiratory care protocols, adoption of a standardized and integrated hospital information system, use of various quality management practices, and general opinions from stakeholders (eg, physicians, RTs, and RT managers) regarding the benefits and outcomes of protocol use. Measures were assessed using online questionnaires, several of which were previously validated scales,[12-14] whereas others were designed specifically for this study. In other instances, because of different hierarchical levels and responsibilities within the hospital and potential differences in the perceptions of protocols, online surveys were designed for and administered separately to each of these stakeholder groups (physicians, RT managers, and RTs).

Overall use was measured as the percentage of patients (0–100%) within each unit who were treated according to an RT-directed respiratory care protocol. Nine different types of respiratory care protocols were considered, including condition-specific protocols (ie, asthma, COPD, ARDS, hypoxemia, and pneumonia) and treatment-specific protocols (noninvasive ventilation therapy, supplemental oxygen titration and discontinuation, ventilator weaning, and bronchopulmonary hygiene). For each type of protocol, respiratory care managers were asked to rate the degree of use of the specific protocol using a 5-point Likert scale (where 5 = always use and 1 = never use). Stakeholder support for using a comprehensive system of respiratory care protocols within a hospital unit was also assessed. Specifically, all survey respondents were asked whether "physicians (or RT managers/RTs) in this hospital unit support a therapist assess and treat program for this unit," where 5 = strongly agree and 1 = strongly disagree.

Organizational support was defined as the respondent's impression about the hospital's general support for process improvement and empowerment programs and was measured based on a validated instrument.[14] Specific questions to assess organizational support included: "This hospital: (1) has an explicit goal to improve processes for patient care; (2) has an explicit goal to focus on increasing value to the patient; (3) is open and responsive to change; and (4) empowers frontline caregivers to make treatment de-

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Hospital Unit: (1) ER, (2) ICU, (3) NICU, (4) Adult in-patient
Assess and Treat Usage [manager, physician]
(1) What percentage (%) of patients in this unit are typically assigned orders of RT "Assess and Treat"?
(2) How often are therapist driven protocols used: (1 – never, 3 – sometimes, 5 – always)

Support from key participants [manager, physician, therapist]
Responses: 1 – strongly disagree → 5 – strongly agree
(1) I am personally in favor of a therapist-driven Assess and Treat system for respiratory care in this unit
(2) The group of physicians in this unit are in favor of a therapist-driven Assess and Treat system for respiratory care
(3) The respiratory care management over this unit are in favor of a therapist-driven Assess and Treat system for respiratory care
(4) The respiratory therapists that work in this unit are in favor of a therapist-driven Assess and Treat system for respiratory care

Organizational Support [manager]
Responses: 1– strongly disagree → 5 – strongly agree
This hospital…
(1) has an explicit goal to improve processes for patient care[14]
(2) has an explicit goal to focus on increasing value to the patient[14]
(3) is open and responsive to change[14]
(4) empowers frontline caregivers to make treatment decisions (new)

Information Systems[13] [manager]
Responses: 1– strongly disagree → 5 – strongly agree
(1) Our electronic information systems are standardized across departments
(2) Our electronic information systems are integrated across departments
(3) Our electronic information systems support frontline employees
(4) Both hardware and software are reliable
(5) Electronic information systems are used to link caregivers actions with patient outcomes

Quality Practices[12] [manager]
Responses: 1 – never, 3 – sometimes, 5 – always
To what extent are these elements used at your hospital:
(1) Patient satisfaction data collection by surveys, focus groups, etc.
(2) Quality improvement teams comprised of hospital employees
(3) Statistical quality or process control using control charts, etc.
(4) Competitive benchmarking of best-in-class processes

Protocol Outcomes Assessment [manager, physician, therapist]
Assess the impact to the following outcomes when patients are treated under a therapist-driven protocol compared to a physician-driven system: (1 – much lower; 3 – no change; 5- much higher)
(1) Cost of patient treatment
(2) Quality of patient care
(3) Job satisfaction of RTs
(4) Workload for RTs
(5) Workload for physicians
(6) Patient satisfaction
(7) Job satisfaction of physicians

Fig. 1. Survey questions [survey respondents in brackets]. ER = emergency room; NICU = neonatal ICU; RTs = respiratory therapists.

cisions." Impressions about the use of information systems were measured using a validated instrument,[13] which addressed the availability, standardization, integration, and use of information systems in a hospital (5-point scale, where 5 = strongly agree and 1 = strongly disagree). Quality practices were measured using an established instrument[12] regarding the use of tools, policies, and behaviors by a hospital unit to achieve quality-improvement goals. These were captured using a 4-item scale regarding the use of competitive benchmarking, statistical process controls, quality-improvement teams, and patient satisfaction. Stakeholder opinions regarding respiratory care protocol use considered respondents' impressions about the impact of protocol use on the cost of care, quality of care, job satisfaction for RTs, work load for RTs, job satisfaction for physicians, work load for physicians, and patient satisfaction, compared with a traditional physician-driven respiratory care order system (Fig. 1).

For each hospital unit assessed, a survey was administered to at least one member of each stakeholder group. Participating hospitals and stakeholders were recruited in various ways. First, the principal investigator (AYM) attended and presented the general research idea at the annual state conferences for the North Carolina Society for Respiratory Care and the South Carolina Society for Respiratory Care, inviting interested attendees to participate.

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Second, an announcement of the study was sent by the American Association for Respiratory Care to its list of respiratory care managers with an invitation to interested parties to contact the principal investigator, who then contacted each interested manager to explain the study and assess interest in participating. Hospital and RT manager anonymity was ensured.

Notably, participating RT managers were critical participants and research collaborators, as they were responsible for identifying participants in their hospital, distributing online surveys within their hospital, and following up on responses. Within each hospital, attempts were made to engage participants from each of the hospital units being studied (ie, emergency department, ICU, neonatal ICU, and adult in-patient unit), if appropriate for that hospital. To encourage participation, weekly reports of current response rates from each hospital unit were provided to each participating RT manager.

After data collection was complete, the scales used in the study were tested for reliability and validity by performing a confirmatory factor analysis and measuring Cronbach's alpha (all $>$ .8) and several goodness-of-fit indices: root mean square error of approximation, comparative fit index, standardized root mean square residual, and coefficient of determination. These scales included organizational support, information systems, and quality practices. Use of protocols, stakeholder opinions of outcomes, and stakeholder support for respiratory care protocol use were all captured by single-item measures and therefore not amenable to reliability and validity testing.

Dichotomous analyses were stratified according to whether respiratory care protocols were used (yes/no), by specific protocol type, and by the level of use (high vs low), where high use indicated that $>$ 60% of patients received care on the hospital unit according to a respiratory care protocol and low use indicated that between 5% and 50% of patients were treated by a protocol. No hospital units in our sample indicated a level of protocol use of between 50 and 60%. Analyses also considered hospital features: size (defined by the number of in-patient beds) and teaching versus non-teaching status (both according to the American Hospital Association, http://www.ahadataviewer.com, *Accessed March 15, 2013*).

Logistic regression was used to identify significant differences between users and non-users of respiratory care protocols, accounting for hospital features and stakeholder responses. Results are expressed as odds ratios,[15] reflecting the odds of being a user versus a non-user of protocols and a high-level versus a low-level user. Statistical analyses were performed using Stata 13 (StataCorp, College Station, Texas).

Table 1. Characteristics of Participating Hospitals

Hospital ID	Teaching	Size (No. of Beds)	Units Participating
A	Yes	256	ICU, ED, AI
B	No	25	ED, AI
C	Yes	395	AI
D	No	197	ED, AI
E	Yes	360	ICU
F	Yes	303	ICU, ED, AI
G	No	350	ICU, AI
H	No	450	ICU, NICU, ED, AI
I	Yes	190	ICU, ED, AI
J	Yes	344	ICU, NICU, ED, AI
K	Yes	524	ICU, NICU
L	Yes	172	ICU, ED, AI
M	Yes	1,267	ICU, AI
N	No	260	ED, AI
O	Yes	303	ICU, NICU, ED, AI
P	Yes	681	ICU, NICU, ED, AI
Q	Yes	308	ICU, NICU, ED, AI
R	No	340	ICU, ED, AI
S	Yes	475	ICU, AI
T	No	86	ICU
U	No	82	ED, AI
V	No	106	ICU, ED, AI
W	Yes	1,637	ICU, AI
X	Yes	152	ICU, AI
Y	Yes	783	ICU, NICU, ED, AI
Z	No	377	ICU, ED, AI
AA	Yes	637	ICU, NICU, ED, AI
BB	Yes	979	ICU, NICU, ED, AI
CC	Yes	420	ICU, NICU, ED, AI
DD	Yes	712	NICU
EE	Yes	103	AI
FF	Yes	116	ICU, AI
GG	No	286	ICU, ED, AI
HH	No	325	ICU
II	Yes	238	ICU, ED, AI
JJ	No	203	ICU, AI
KK	No	121	ICU
LL	No	110	ICU, ED, AI
MM	Yes	514	ICU, NICU, ED, AI
NN	No	215	ICU, AI
OO	No	134	ICU
PP	Yes	530	ICU, ED, AI
QQ	No	365	ICU, NICU, AI
RR	Yes	921	ICU

ED = emergency department
AI = adult in-patient unit
NICU = neonatal ICU

Results

Participating hospitals varied in size from 25 to 1,637 beds (mean ± SD of 405 ± 279), with 59% being teaching hospitals (Table 1). Of the 61 hospitals that initially

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Table 2. Patterns of Respiratory Care Protocol Use for All Included Units (105 Units, Manager Survey)

Protocol	Level of Protocol Use (%)		
	Never	Infrequent	Frequent
Condition-specific protocols			
Asthma	26	29	45
COPD	28	23	50
ARDS	38	27	35
Hypoxemia	22	23	54
Pneumonia	30	23	47
Treatment-specific protocols			
Noninvasive ventilation therapy	26	25	49
Oxygen titration and discontinuation	13	23	64
Ventilator weaning	20	23	57
Bronchopulmonary hygiene	28	35	37

agreed to participate in the study, responses from at least 2 different stakeholder types were received from 44 hospitals (66%). In total, usable responses were received from 105 RT managers, 79 physicians, and 571 RTs. Furthermore, the number of participating units with at least 2 stakeholders represented included 37 ICUs, 13 neonatal ICUs, 25 emergency departments, and 36 adult in-patient units.

The results in Table 2 show that oxygen titration and discontinuation and ventilator weaning protocols were most frequently used (64% and 57%, respectively), where "frequent use" bundles stakeholder responses of "often" and "always" and "infrequent use" bundles responses of "rarely" and "sometimes." Overall, nearly half of the participating hospitals were frequent users of 7 of the 9 protocols surveyed, with protocols for ARDS and pneumonia used least frequently (38% and 30% of hospitals, respectively).

Teaching hospitals reported a non-significant trend toward using treatment-specific protocols more frequently and condition-specific protocols less frequently than non-teaching hospitals (Table 3). The overall use of protocols was significantly greater in larger hospitals than in smaller hospitals ($P = .01$). Furthermore, larger versus small hospitals (Table 4) were statistically different in their use of protocols for asthma ($P = .02$), ARDS ($P = .02$), hypoxemia ($P = .01$), oxygen titration and discontinuation ($P = .03$), ventilator weaning ($P = .02$), and bronchopulmonary hygiene ($P = .07$).

Table 5 presents the impressions of different stakeholder groups (physicians, RT managers, and RTs) regarding the impact of protocol use versus physician-directed care. All groups felt that protocol use lowered the cost of care, improved quality, enhanced RT and physician satisfaction, lowered physician work load, and enhanced patient satisfaction. Impressions regarding the impact of protocol use on RT work load differed between groups, with RTs equally divided among those believing work load increased (37%), decreased (31%), or remain unchanged (32%), but most physicians (54%) believed that RT work load increased, and the plurality of RT managers (42%) believed that RT work load decreased.

Table 6 presents the results of logistic regression analysis of factors associated with respiratory care protocol use. Odds ratios (ORs) for using protocols significantly exceeding 1 (ie, positively associated with protocol use) were observed for physician support (OR = 3.68, $P < .01$) and for use of high-quality hospital information systems (OR = 2.33, $P = .03$), with a trend toward protocol use being associated

Table 3. Use of Respiratory Care Protocols Stratified by Hospital Teaching Status (105 Units, Manager Survey)

Protocol	Level of Use (%)					
	Never		Infrequent		Frequent	
	Teaching	Non-Teaching	Teaching	Non-Teaching	Teaching	Non-Teaching
Condition-specific protocols						
Asthma	25	27	37	17	38	57
COPD	29	26	24	19	47	55
ARDS	30	54	34	14	36	32
Hypoxemia	25	17	27	17	47	67
Pneumonia	29	32	27	14	43	54
Treatment-specific protocols						
Noninvasive ventilation therapy	33	15	20	33	48	52
Oxygen titration and discontinuation	18	6	12	38	69	56
Ventilator weaning	20	19	24	22	55	59
Bronchopulmonary hygiene	30	26	32	41	39	33

Teaching status was defined according to the American Hospital Association (http://www.ahadataviewer.com, *Accessed March 15, 2013*).

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Table 4. Use of Respiratory Care Protocols Stratified by Hospital Size (105 Units, Manager Survey)

Protocol	Level of Use (%)					
	Never		Infrequent		Frequent	
	Small Hospital	Large Hospital	Small Hospital	Large Hospital	Small Hospital	Large Hospital
Condition-specific protocols						
Asthma	33	18	26	33	40	50
COPD	25	24	33	27	42	49
ARDS	44	32	37	16	20	51
Hypoxemia	29	15	29	18	41	68
Pneumonia	38	23	18	28	44	50
Treatment-specific protocols						
Noninvasive ventilation therapy	28	24	33	15	38	62
Oxygen titration and discontinuation	17	8	30	14	53	78
Ventilator weaning	33	5	19	28	48	67
Bronchopulmonary hygiene	31	25	43	28	26	47

Small hospitals were defined as those with fewer than the median number of beds in the hospitals surveyed (median = 350 beds).

Table 5. Analysis of Stakeholder Impressions of the Hospital and the Perceived Impact of Respiratory Care Protocol Use

Impact of Respiratory Care Protocol Use on:	Physicians (n = 79), %			RT Managers (n = 105), %			RTs (n = 571), %		
	Lower	No Change	Higher	Lower	No Change	Higher	Lower	No Change	Higher
Cost of care	66	31	3	90	9	1	75	20	5
Quality of care	3	32	66	1	9	90	1	17	82
RT job satisfaction	1	10	89	2	4	94	2	6	92
RT work load	18	28	54	42	33	24	37	32	31
Physician job satisfaction	0	49	51	1	45	54	4	44	52
Physician work load	51	42	7	68	26	6	61	29	10
Patient satisfaction	1	42	56	2	15	83	2	11	87

RT = respiratory therapist

with having organizational support (OR = 5.46, P = .07). ORs for other features (including RT and RT manager support, use of quality practices, and hospital and unit characteristics) did not differ significantly from 1 (all $P > .10$). Factors significantly associated with high use of protocols included physician support (OR = 18.20, $P < .01$) and RT support (OR = 16.92, P = .04), with high use of protocols marginally associated with use of quality practices in a hospital (OR = 15.05, P = .06).

Discussion

The main findings of this study are: (1) Use of 9 specific types of respiratory therapy protocols was associated with specific hospital characteristics, such that larger hospitals tended to use specific protocols more frequently than smaller hospitals, but teaching hospitals and non-teaching hospitals used specific respiratory care protocol types similarly. (2) All stakeholder groups agreed that use of respiratory care protocols conferred benefits (ie, lowering cost, improving patient satisfaction, and enhancing quality of respiratory care delivered), but disagreed regarding the impact of protocols on RT work load. Physicians believed that protocol use increased RT work load, and RT managers believed that protocol use decreased RT work load. RTs themselves were approximately equally divided regarding the impact of protocols on their own work load. (3) Multivariate analysis indicated that the features most strongly associated with protocol use (vs non-use) were physician support for their use and the use of a high-quality hospital information system. Likewise, RT support and additional hospital quality practices were associated with high use (vs low use) of protocols, but not with use versus non-use.

Our survey data indicate that physician support is important for both protocol adoption and high levels of use. Although RT support was not associated with the adoption of respiratory protocols, among hospital units that had

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Table 6. Results of Logistic Regression Analysis of Various Hospital Features Associated With Respiratory Care Protocol Use and Frequency

Hospital Feature	Odds Ratio			
	Group 1 (Users)*	*P*	Group 2 (High Use of Respiratory Care Protocols)†	*P*
Manager support	0.31	.27	0.13	.13
Physician support	3.68	.001‡	18.20	.001‡
RT support	2.97	.13	16.92	.04‡
Organizational support	5.46	.07‡	0.29	.38
Quality practices	0.50	.34	15.05	.06‡
Information systems	2.33	.03‡	0.88	.84
Teaching	0.64	.61	0.35	.33
Hospital size	1.00	.11	1.00	.39
ICU	3.44	.11	4.83	.26
Neonatal ICU	5.32	.13	1.78	.73
Emergency department	2.81	.23	0.31	.13
Pseudo R^2	0.41		.59	
n	105		66	

* Users compared with non-users of respiratory care protocols
† High use compared with low use of respiratory care protocols
‡ Features showing significant associations ($P < .05$) or strong trends ($P < .10$)
RT = respiratory therapist

protocols, RT support was significantly associated with their clinical use. In addition, quality practices were not associated with adoption, but among hospital units using protocols, those units with general quality practices tended to have high levels of protocol use.

Finally, the observation that adoption of a high-quality hospital information system was associated with overall use of protocols but not with frequency of use suggests that having an information system is a necessary but not sufficient condition for protocol use. Adopting a respiratory care protocol may not be possible without an integrated hospital information system to track patterns and outcomes of utilization. However, once protocols were in use, the information system did not exert an influence on protocol use frequency.

This study extended available knowledge regarding the adoption and use of respiratory care protocols by assessing various hospital features associated with protocol use and also by multivariate analysis of correlates of protocol use. Prior randomized controlled trials in single-hospital settings showed that protocol use was associated with enhanced clinical quality and allocation of respiratory care.[5,10] To our knowledge, only one previous study evaluated correlates of respiratory care protocol use.[11] In that study, a change-avid environment in the RT department was positively associated with use of respiratory care protocols, but neither hospital characteristics nor features of stakeholder support were evaluated. In our study, the broader analysis of features associated with frequency and use of protocols permits a fuller understanding of features needed for successful implementation of respiratory care protocols and the hierarchy of the conditions that must be met. For example, physician support and the availability of a high-quality hospital information system appear to be necessary conditions. Similarly, support by RTs appears to be an important determinant of the frequency of protocol use, thereby affirming the impact of empowerment on first-line employees.[16,17] This finding confirms a substantial body of literature from sectors other than health care that shows that first-line worker empowerment is associated with enhanced organizational performance. For example, 2 meta-analyses demonstrated that individual-level empowerment is associated with greater individual and team performance measures.[17,18] Specifically, when employees have higher levels of empowerment, they perceive a greater impact on their jobs, which in turn drives higher levels of overall job performance.[17,19] In addition, higher levels of employee empowerment have been shown to raise employee job satisfaction, increase organizational commitment, and decrease turnover intent.[16,17]

Several limitations of this study warrant mention. First, despite extensive recruitment efforts, the number of participating physicians ($n = 79$) remained relatively small compared with other stakeholder groups ($n = 105$ for RT managers and $n = 571$ for RTs). Also, the number of hospitals studied (44) was relatively small. In addition, the method by which hospitals elected to participate and RT managers agreed to facilitate the study may reflect a selection bias toward participation-prone institutions and staff. Finally, our survey did not include nurses, whose opinions regarding the use of respiratory care protocols would complement the perspectives of physicians, RT managers, and RTs. The limitations of small sample size and possible selection bias may decrease the generalizability of our findings.

Second, because the study is descriptive, the results are necessarily hypothesis-generating and require validation in a separate analysis in which an a priori hypothesis is confirmed in a separate cohort of hospitals. As an example, to confirm the role of physician support and information system use in protocol adoption, future studies should select different hospitals on the basis of physician support for protocols and the presence versus absence of a high-quality hospital information system and then measure differences regarding protocol use in these disparate hospital groups.

A third limitation of the study is that it depended on subjective reports of protocol use, cost, and quality of care by surveyed stakeholders rather than on use of actual objective measures of cost and quality (eg, hospital readmission rates, sentinel event frequencies) or actual protocol use. Self-reported data may clearly be subject to bias.

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Conclusions

In summary, this study examines the use of respiratory protocols across multiple hospitals. Although confirmation of some of the findings in hypothesis-testing studies is warranted, our results clarify existing patterns and perceptions of protocol use, which may impact protocol implementation and benchmarks.

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